

The cognitive outcome in athletics among physical education teachers

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ABSTRACT

The study aimed to identify the cognitive outcome in athletics for physical education teachers. The descriptive survey method was used and a cognitive test was applied as a measurement tool for data collection, which included 45 items for the fields of study: running, jumping, and throwing, and the study sample consisted of 198 teachers from Irbid First Directorate of Education in the first academic semester 2022/2023. The results showed that the level of the cognitive outcome in athletics for physical education teachers was "average" and that there were no statistically significant differences ($\alpha \leq 0.05$) due to the effect of gender in all fields and all total scores, and the results of the study showed that there are significant differences Statistics in favor of more than 10 years experience.

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1. INTRODUCTION

The cognitive outcome in athletics is one of the most important pillars, which physical education teachers should possess both practically and theoretically, so that they will be able, through various teaching methods, to communicate the cognition by the events of athletics from the curriculum provided to the students. Hamid [1] defined it as the sum of what the individual possesses of different knowledge, which he acquired through academic education, the courses or experiences that appear clearly, when possessed, by the percentage of the person's cognitive achievement and the level of the group he leads as a coach at the sports level.

Events of athletics appeared in different civilizations since ancient times. They are diverse and varied, such as running, jumping, and throwing, they need particular physical properties for every activity and are called the mother of the games [2]. It is one of the elements instruction processes that is taught in the physical education faculties and departments at both the domestic and international levels. It is considered one of the most important courses that students must master all its events and know its legal, technical, and educational features, in which the basis of success depends on the total grades the students gain in these events [3]. Most often, these grades are of no significance unless converted into standard grades, through which we can know the student's level relative to his group, so it will be an important evaluation means (Ms) [4].

Athletics is characterized by objectivity in evaluating human achievement, where levels are translated into times in the track events, and into distances and heights in the field events. Athletics events are considered one of the basic movements of young people [5]. They are deemed among the simple activities and are close to those of the daily life requirements, such as running, jumping, and walking, in terms of their performance and learning ways, especially in the primary learning stages [6].

Jumping events require high abilities in many physical or skill aspects. They all affect the level of performance and athletic achievement, but their importance degree varies according to the type of activity practiced and the type of resistance that this activity faces [7]. As for the jump events, the main objective is to achieve the best possible horizontal distance in each of the long or triple jumps and to achieve the best possible vertical distance in the high jump. To achieve this, it is necessary to follow the correct scientific methods in teaching, training, and applying these events [8].

All jump events start with approaching and end with landing. The challenge is to perform these events by trying to achieve the best digital achievement, which requires the jumper's knowledge about the particulars of the technical performance stages of these events, this will enable him to jump accurately to guarantee reaching the farthest distance, which also requires preparing the student physically, skillfully and mentally, in order to achieve the best performance of these events [9].

The triple jump event is one of the athletics events in which the performance is affected by the development of the special power, including (explosive power, power characteristic of speed, and power of performance), which engages the type of power to be achieved during the performance of the technical stages of this event [10]. The triple jump is an exciting and desirable competition, but it is difficult and has a strong impact on the systems, joints, and muscles. The first jump was called hopscotch, the second step, and the third jump; these names are all combined in the triple jump name [11].

The high jump is one of the most difficult events that are practiced in athletics because it depends on the power characteristic speed, which assists in reaching the maximum possible height. The more the power speed decreases, the lower the height with it will be [12]. High jump also depends on transferring the horizontal speed to vertical, and transferring the body's center gravity towards the beam and then over it. The height of the body's center of gravity should be maintained during ascent due to its significant importance, which depends on the player's height and the position of his body during ascent [13].

The issue of the cognitive outcome is one of the important issues that proceed in any area. Knowledge is the thinking center to help the individual distinguish between right and wrong. Its significance lies in exploiting it to shape the positive attitudes to form a link to the field practice of the athletics events, so that they become regular behavior, and the events become applied on the ground [14]. Examinations are among the important scientific methods the researchers rely upon as a comprehensive basis, which begins with setting the goal. Here, we have to resort to the different measurement instruments to know the extent to which individuals have multiple knowledge of many games.

The best way to measure the cognitive outcome begins with mastering the information and knowledge in the cognitive examinations that also begin with setting the content areas, the relative importance of every area, preparing the specification table, defining the method of coining and preparing the examination items, verifying their scientific validity, and coming out with clear instructions for the examination [15]. Cognitive measurement is a Ms to define the extent of possessing data and information and mastering the skills, games, and plans. Consequently, the cognitive exam is one of the important measurement tools that achieve the objectives of the theoretical and scientific courses. Al-Dasouqi *et al.* [16] pointed out that knowledge is linked to the practical aspect. The more the knowledge increases, the greater the opportunity for practice and proper application.

The researchers observed this through teaching in physical education faculties, supervising practical education students, and the performance of the physical education teachers in teaching and training the athletics, that there is a wide cognitive gap between knowledge and application of the athletics events, which is in line with the results of Atiyat and Taifour [17]. This also was clear through the dialogue and discussions with the teachers during the visits, and watching the champions organized by the Directorate of Education for the schools. Therefore, the researchers decided to carry out a diagnostic study of the reality of the cognitive level of the teachers in the events of the athletics. Significance of the study is embedded in the following:

- i) Contribution to the development and improvement of the athletics events through highlighting the cognitive aspect of the events, due to the major role that cognition plays in this domain.
- ii) Briefing on the technical and legal aspects of athletics events that help teachers teach the students about different activities in a correct and proper manner.
- iii) Detecting strengths and weaknesses in teachers' cognitive aspects, and working to address them and develop their positive aspects, to help them tackle the challenges they face while teaching the skills.

The study aims to measuring the cognitive outcome of the athletics among the physical education teachers. And the study also aims to Identifying the statistical differences in the measurement level of the cognitive outcome in athletics among the physical education teachers, which are ascribed to the gender

variable (males, females), and the experience variable (less than 5 years, from 5 to 10 years, and more than ten years). Also, the study aims to answer the following questions:

- i) What is the cognitive outcome level in athletics among physical education teachers?
- ii) Are there statistically significant differences at ($\alpha \leq 0.05$) level in the cognitive outcome level of the athletics among the physical education teachers, which are ascribed to the gender variable?
- iii) Are there statistically significant differences at ($\alpha \leq 0.05$) level in the cognitive outcome level of the athletics among the physical education teachers, which are ascribed to the experience variable (less than 5 years, from 5 to 10 years, and more than 10 years)?

2. METHOD

The descriptive, survey, and analytical methods were applied due to their suitability to the nature and objectives of the study. The study population consisted of all the physical education male and female teachers in Irbid First Education Directorate in the first academic semester 2022/2023 academic year ($n=236$); 108 males and 128 females. The study sample participants, 198 male and female teachers, 84% of the study population, were randomly chosen and were distributed over two groups: 96 males (48.5%) and 102 females (51.5%), 60 teachers have experienced less than 5 years (30.3%), 68 teachers from 5 to 10 years (34.3%), while 70 teachers more than 10 years (35.4%), as shown in Table 1.

2.1. Study instrument

The researchers constructed and designed a cognitive exam in the athletic events, and relied on the scientific properties such as validity and reliability for the data collection. The exam consisted of three main domains of the athletic events: (running, jumping, and throwing), so that phrasing the items was made for both the educational technique and legal aspects of every event. The researchers defined the exam questions through the multiple choice method, as these types of exams are considered suitable to know the cognitive outcome in the educational outputs. This way is further characterized by very high clarity and objectivity. The researchers benefited from the previous studies [18], [19] in phrasing the items of the study instrument.

2.2. Scientific coefficients

The researchers prepared the exam with 50 items in its initial form and then presented it to five specialists and experts in teaching the courses of athletic events in the faculties of education. Furthermore, the researchers reviewed the relevant scientific and theoretical references and sources [20]. A number of the questions were removed due to their inconsistency with the teachers' level, or due to the repetition of some questions. The final number of the items (questions), after deletion and amendment were 45 items distributed over the main three domains: running, jumping, and throwing.

Table 1. Distribution of the study participants

Variables	Categories	Frequency	Percentage (%)
Gender	Male	96	48.5
	Female	102	51.5
Experience	<5 years	60	30.3
	5 to 10 years	68	34.3
	>10 years	70	35.4
Total		198	100.0

2.3. Statistical standard

The criteria of results evaluation were adopted according to previous study [21], [22]. The grades were classified as: (less than 50: fail (phrased as poor), 50-59: poor, 60-69: satisfactory, 70-79: good, 80-89: very good, and 90-100: excellent).

2.4. Statistical processing

To analyze the results, a program was used SPSS program to calculate the Ms, standard deviations (SDs), frequencies and percentages, difficulty coefficients, discrimination coefficients, Kuder and Richardson coefficient, the corrected reliability coefficient, t-test for differences of the correlated samples, one way ANOVA test, and Scheffe test. The percentage of the students who provided wrong responses was adopted as a difficulty coefficient for every item. Meanwhile, the discrimination coefficient of every item was calculated in the shape of the relatedness of the items to the overall degree. The coefficients of the items ranged between

0.27 and 0.67, and the discrimination coefficients ranged between 0.46 and 0.81. AL-Khaza'aleh and AL-Oloum [23] pointed out that the acceptable range of the item difficulty ranges between 0.30 and 0.80, as well as the item discrimination. The item is deemed good and acceptable if its discrimination coefficient is more than 0.39, and is recommended to be improved if the discrimination coefficient is between 0.20 and 0.39. It is considered poor and is recommended to be deleted if the discrimination coefficient ranges between zero and 0.19, and must be deleted if the discrimination coefficient was negative. Accordingly, none of the items was deleted due to the difficulty or discrimination coefficients.

To ensure the test reliability, it was realized by the test-retest method, i.e. applying the test and reapplying it two weeks later to a group from outside the study sample ($n=15$ male and female teachers). Then Pearson's correlation coefficient was calculated between their evaluations both times, which amounted to 0.90 for the test as a whole. In addition, the reliability coefficient was calculated through the internal consistency according to the Kuder and Richardson coefficient, which amounted to 0.88 for the test as a whole.

3. RESULTS AND DISCUSSION

Table 2 indicates that the Ms ranged between 0.56 and 0.65 and the running domain ranked first with the highest M (0.65), while the throwing domain came last with 0.56 M. The M of the cognitive outcome level, as a whole, in athletics among the physical education teachers, amounted to 0.61 with a medium level. This is ascribed to that the cognitive outcome in the running domain is available in the best manner due to the ease of application and implementation in the school environment through the curriculum, contests, and similar activities inside and outside the school environment [24], and provide good and medium cognition, as compared with other domains. These results are in line with previous study [25].

To answer this question, the Ms and SDs of the cognitive outcome level in athletics among the physical education teachers according to the gender variable were extracted. T-tests are used to calculate the differences between the cognitive outcome levels in athletics among the physical education teachers. Table 3 indicates that there are no statistically significant differences at ($\alpha \leq 0.05$) level attributed to the gender effect in all the domains and the overall degree. This is ascribed to that the cognitive outcome is similar in level between the males and females, as both parties are provided training and arbitration courses from the Ministry of Education, and the athletics federation. In addition, the levels are close to each other as they both study in the same universities and the same faculties of education. This result is consistent with the result of Al-Khazaleh [26], but not in line with that of Osborne *et al.* [27] which indicated that there are statistically significant differences according to the gender variable in the cognitive outcome in the technical field of the jump.

To answer this question, the researchers extracted the Ms and SDs to calculate cognitive outcome levels in athletics among physical education teachers. Table 4 indicates that there is a discrepancy in the Ms and SDs of the cognitive outcome level in athletics among the physical education teachers, due to the difference in the categories of the experience variable. To illustrate the significance of the statistical differences among the Ms, ANOVA analysis was employed, as shown in Table 5.

Table 2. M and SD deviations of the cognitive outcome level in athletics among the physical education teachers, arranged in descending order as per the Ms

Rank	Number	Domain	M	SD	Level
1	1	Running	0.65	0.244	Medium
2	2	Jumping	0.63	0.228	Medium
3	3	Throwing	0.56	0.229	Poor
Overall degree			0.61	0.236	Medium

Table 3. M, SD, and t-test of the effect of gender on the cognitive outcome level in athletics among the physical education teachers in Irbid First Education Directorate

Domain	Gender	No.	M	SD	T-value	Degrees of freedom	Sign.
Running	Male	96	0.66	0.251	0.742	196	0.459
	Female	102	0.63	0.237			
Jumping	Male	96	0.63	0.242	0.362	196	0.718
	Female	102	0.62	0.215			
Throwing	Male	96	0.57	0.237	0.713	196	0.477
	Female	102	0.55	0.221			
Overall degree	Male	96	0.62	0.237	0.628	196	0.531
	Female	102	0.60	0.216			

Table 4. M, SD of the cognitive outcome level in athletics among the physical education teachers

Domain	Experience	No.	M	SD
Running	<5 years	60	0.59	0.205
	5 to 10 years	68	0.61	0.262
	>10 years	70	0.72	0.239
	Total	198	0.65	0.244
Jumping	<5 years	60	0.56	0.202
	5 to 10 years	68	0.60	0.240
	>10 years	70	0.71	0.217
	Total	198	0.63	0.228
Throwing	<5 years	60	0.51	0.190
	5 to 10 years	68	0.52	0.246
	>10 years	70	0.63	0.226
	Total	198	0.56	0.229
Overall degree	<5 years	60	0.56	0.191
	5 to 10 years	68	0.58	0.240
	>10 years	70	0.69	0.222
	Total	198	0.61	0.226

Table 5 indicated the statistically significant differences at ($\alpha \leq 0.05$) level attributed to the experience effect in all the domains and in the overall degree. In order to show the even, statistically significant differences between the Ms, post hoc comparisons were used by the Scheffe method, as shown in Table 6.

Table 6 indicates that there are differences between categories in favor of more than 10 years, which can be attributed to that the teachers with more than 10 years' experience have cognitive accumulation as well as cognitive, information outcome about the study domains (running, jumping, and throwing) more than other categories, because they are subject to training and arbitration courses [28]. In addition, they review the curriculum implementation inside and outside the school environment, through multiple activities, such as athletics championships at the level of the directorates of education and the athletic federation championships. Consequently, they gained information amounts and cognitive outcomes more than teachers of less experience. These results are similar to those of several researches [29], [30].

Table 5. ANOVA analysis to identify the effect of experience on the cognitive outcome level in athletics among teachers

Domain	Source	Total squares	Degrees of freedom	Squares mean	F	Sign.
Running	Inter-group	0.656	2	0.358	0.5799	0.004
	Intra-group	11.032	195	0.057		
	Total	11.688	197			
Jumping	Inter-group	0.730	2	0.365	7.470	0.001
	Intra-group	9.527	195	0.049		
	Total	10.257	197			
Throwing	Inter-group	0.580	2	0.290	5.819	0.004
	Intra-group	9.710	195	0.50		
	Total	10.290	197			
Overall degree	Inter-group	0.650	2	0.325	6.729	0.001
	Intra-group	9.424	195	0.048		
	Total	10.075	197			

Table 6. Post hoc comparisons by the Scheffe method for the effect of the cognitive outcome level in athletics among physical education teachers

Domain	Experience	M	<5 years	5 to 10 years	>10 years
Running	<5 years	0.59			
	5 to 10 years	0.61	0.021		
	>10 years	0.72	0.130*	0.109*	
Jumping	<5 years	0.56			
	5 to 10 years	0.60	0.034		
	>10 years	0.71	0.142*	0.108*	
Throwing	<5 years	0.51			
	5 to 10 years	0.52	0.007		
	>10 years	0.63	0.117*	0.110*	
Overall degree	<5 years	0.56			
	5 to 10 years	0.58	0.020		
	>10 years	0.69	0.130*	0.109*	

4. CONCLUSION

The level of knowledge in athletics among physical education teachers was moderate, and there were no statistically significant differences attributable to the effect of gender (male and female) in all areas and the total score. However, there are statistically significant differences in the experience variable in favor of the more than 10-year group. Recommendation related to this study is the Ministry of Education should focus on providing male and female teachers with knowledge about running, jumping, and throwing for athletic events, and engage them in specialized scientific conferences, holding more training courses and regular workshops on the major athletics, especially for the teachers with less than 5 years experience, to enable them to raise their cognitive level through the training and legal aspects.




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